

ABSTRACT OF THE DISCLOSURE

A metal gate electrode is formed with an intrinsic electric field to modify its work function and the threshold voltage of the transistor. Embodiments include forming an opening in a dielectric layer by removing a removable gate, depositing one or more layers of tantalum nitride such that the nitrogen content increases from the bottom of the layer adjacent the gate dielectric layer upwardly. Other embodiments include forming the intrinsic electric field to control the work function by doping one or more metal layers and forming metal alloys. Embodiments further include the use of barrier layers when forming metal gate electrodes.

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